What is claimed is:

1. An apparatus, comprising:

a condensed array addressed device including a plurality of addressable cells, each of the plurality of addressable cells including at least two electrodes; and

a spectroscope optically coupled to the condensed array addressed device.

2. The apparatus of claim 1, wherein the spectroscope includes an infrared spectroscope.

3. The apparatus of claim 2, wherein the infrared spectroscope includes a Fourier transform infrared spectroscope.

4. The apparatus of claim 2, wherein an infrared spectroscope signal from the infrared spectroscope is electromodulated by applying potential between the at least two electrodes in at least one of the plurality of cells

5. The apparatus of claim 2, wherein an infrared spectroscope signal from the infrared spectroscope is photo-modulated by applying a modulated UV-VIS signal to a surface of at least one of the at least two electrodes.

6. The apparatus of claim 1, wherein the condensed array addressed device includes a waveguide total internal reflection prism optically coupled to a region proximal electrodes of a cell and the spectroscope is optically coupled to the waveguide.

7. The apparatus of claim 6, wherein the waveguide includes a total internal reflection prism and the spectroscope is optically coupled to the total internal reflection prism.

8. The apparatus of claim 1, wherein each of the plurality of addressable cells includes an individually addressable cell.

9. The apparatus of claim 8, wherein the individual addressable cell includes a first individually addressable electrode and a second individually addressable electrode.

10. The apparatus of claim 1, wherein each of the plurality of addressable cells includes a pair of electrodes that are less than approximately 200 microns in size and the spacing of the electrodes is less than approximately 200 microns.

11. The apparatus of claim 10, wherein each of the pair of electrodes are less than approximately 100 nm in size.

12. The apparatus of claim 10, wherein the spacing of the pair of electrodes is less than approximately 100 nm.

13. The apparatus of claim 10, wherein each of the pair of electrodes includes at least one member selected from the group consisting of single-walled carbon nanotubes and silicon nano-wires.

14. The apparatus of claim 1, wherein the plurality of addressable cells define a plurality of sensor elements configured as an array, wherein each of the sensor elements is functionalized to interact with one or more target molecules; and further comprising control circuitry coupled to the sensor elements, wherein the control circuitry is configured to detect interactions of the sensors with the target molecules.

15. The apparatus of claim 14, wherein the plurality of sensor elements are configured as a two-dimensional array and are addressable using memory cell techniques.

16. The apparatus of claim 15, wherein the plurality of sensor elements are addressable by corresponding rows and columns of the two-dimensional array.

17. The apparatus of claim 14, wherein the plurality of sensor elements are configured as a high-density array.

18. The apparatus of claim 14, further comprising memory coupled to the control circuitry, wherein the control circuitry is configured to store data corresponding to the plurality of sensor elements in the memory.

19. The apparatus of claim 1, further comprising a microfluidic channel coupled to at least one of the addressable cells.

20. The apparatus of claim 1, further comprising a selective membrane coupled to at least one of the addressable cells.

21. The apparatus of claim 20, wherein the selective membrane includes at least one member selected form the group consisting of chemically selective membranes and biologically selective membranes.

22. A method comprising:

providing a spectroscope optically coupled to an integrated array of cells, each of the cells including a sensor element; and

functionalizing each of the sensor elements to interact with a target molecule.

23. The method of claim 22, further comprising exposing each of the sensor elements to a sample and detecting whether the target molecule in the sample interacts with each of the sensor elements.

24. The method of claim 23, wherein detecting includes measuring an optical property.

25. The method of claim 24, wherein measuring includes infrared spectroscopy.

26. The method of claim 25, wherein infrared spectroscopy includes Fourier transform infrared spectroscopy.

27. The method of claim 23, wherein measuring includes conveying an optical signal via total internal reflection.

28. The method of claim 23, wherein detecting further includes measuring an electrical property.

29. The method of claim 28, wherein measuring includes impedance spectroscopy.

30. The method of claim 28, wherein measuring the electrical property includes individually addressing one of the cells.

31. The method of claim 30, wherein individually addressing one of the cells includes individually addressing one of the sensor elements and measuring the electrical property independent of any of the other sensor elements.

32. The method of claim 30, further comprising repeating measuring the electrical property and integrating to reduce a signal to noise ratio associated with the integration.

33. A method, comprising:
determining whether a target molecule has coupled to a condensed array addressed device by characterizing a subsequent rate of electrolysis on the condensed array addressed device.

34. The method of claim 33, wherein coupled includes chemical bonding.

35. The method of claim 33, wherein characterizing includes measuring the polarization of an electrode during electrolysis.

36. A data structure comprising results obtained using the method of claim 33.

37. A method, comprising:

fabricating a condensed array addressed device including forming vias to connect an electrodes to an address line and filling the via with conductive material to define a plug including damascene patterning at least one member selected from the group consisting of the via, the plug and the address line.

38. The method of claim 37, wherein the via is etched to the address line and another structure is simultaneously etched to a stop feature.

39. The method of claim 37, wherein damascene patterning includes dual damascene patterning including separately defining the via and address line.

40. A condensed array addressed device produced by the method of claim 37.